# Spot Safety Project Evaluation

Project Log # 200406237

Spot Safety Project # 05-94-037

**Spot Safety Project Evaluation, of the Traffic Signal Installation, at the Intersection of SR 1300-Kildaire Farm Road and Lochmere Drive in Cary, Wake County**

Documents Prepared By:

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_____ 03/21/2005
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# *Spot Safety Project Evaluation Documentation*

## Subject Location

Evaluation of Spot Safety Project Number 05-94-037 – The Intersection of SR 1300-Kildaire Farm Road and Lochmere Drive in Cary, Wake County

## Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis and an Odds Ratio comparison analysis has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

## Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a two-phase fully actuated traffic signal. D.J. Darity, Assistant Area Traffic Engineer, originally requested the improvements. SR1300-Kildaire Farm Road is a four-lane divided facility with left turn lanes at the intersection with Lochmere Drive. Lochmere Drive is a two-lane divided facility with a left turn lane on the eastbound approach and a right turn lane on the westbound approach at the treatment intersection. The westbound approach lanes on Lochmere were reassigned from having an exclusive left turn lane to an exclusive right turn lane in 2001. SR 1300-Kildaire Farm Road has a speed limit of 45 mph. Lochmere has a speed limit of 35 mph. The initial crash analysis for this location was completed from December 1, 1990 through November 30, 1993 with a total of ten reported crashes (including six angle crashes). The final completion date for the improvement at the subject intersection was on January 22, 1997.

## Comparison Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from December 1, 1996 through February 28, 1997. The before period consisted of reported crashes from May 1, 1990 through November 30, 1996 (6 Years, 7 Months) and the after period consisted of reported crashes from March 1, 1997 through September 30, 2003 (6 Years, 7 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersections of SR 1300-Kildaire Farm Road and Audubon Park-Cresent Commons, SR 1300-Kildaire Farm Road and Cresent Green, and SR 1300-Kildaire Farm Road and Glen Echo-Cresent Arbors. Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. Please note that Frontal Impact Crashes and Angle Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information

| | Before | After | Percent Reduction (-)/ Percent Increase (+) |
|---|---|---|---|
| Total Crashes | 22 | 37 | 68.2 |
| Total Severity Index | 11.25 | 3.40 | - 69.8 |
| Frontal Impact Crashes | 14 | 20 | 42.9 |
| Frontal Severity Index | 15.00 | 4.33 | - 71.1 |
| Volume | 15700 | 20000 | 27.4 |

Comparison Information

| | Before | After | Percent Reduction (-)/ Percent Increase (+) |
|---|---|---|---|
| Total Crashes | 14 | 39 | 178.6 |
| Total Severity Index | 3.64 | 5.22 | 43.4 |
| Frontal Impact Crashes | 7 | 14 | 100.0 |
| Frontal Severity Index | 3.11 | 10.11 | 225.1 |
| Volume | 15700 | 20000 | 27.4 |

Odds Ratio: Treatment versus Comparison

| | Before | After | Percent Reduction (-)/ Percent Increase (+) |
|---|---|---|---|
| Treatment Total Crashes | 22 | 37 | --- |
| Comparison Total Crashes | 14 | 39 | - 39.6 % |

The naive before and after analysis at the treatment location resulted in an 68.2 percent increase in Total Crashes, a 69.8 percent decrease in the Total Severity Index, and a 27.4 percent increase in Average Daily Traffic (ADT). The comparison locations experienced a 178.6 percent increase in Total Crashes, a 43.4 percent increase in the Total Severity Index, and a 27.4 percent increase in ADT. The before period ADT year was 1993 and the after period ADT year was 2000.

The Odds Ratio is used as another means of calculating the treatment effect. The total crashes in the before and after period from the Comparison Strip are used to calculate the percent reduction in total crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 39.6 percent decrease in Treatment Intersection crashes.

The attached data Table 1 depicts the Naive Before and After Analysis for the above information. The data in Tables 1 consists of an overall crash summary and a crash type summary for the treatment intersection. The overall crash summary contains high level crashes, crash rates, and vehicle exposure statistics. The crash type summary contains crashes broken down by accident type. Before period crash data, after period crash data, and the percent change in crashes from the before to the after period are also included.

**Results and Discussion**

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 68.2 percent increase in Total Crashes and a 42.9 percent increase in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 39.6 percent decrease in Total Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had an increase in the number of crashes from the before to the after period when using the naïve before and after analysis method. However, when using the Odds Ratio to calculate the treatment effect, there is a decrease in the number of Total Crashes from the before to the after period. Although there was an increase in the number of crashes at the treatment location, the crash severity decreased dramatically.

The Severity Index for Total Crashes and Frontal Impact Crashes at the treatment intersection decreased by 69.8 percent and 71.1 percent, respectively. The number of Angle Crashes decreased by a minimal amount from the before period (6 crashes) to the after period (5 crashes). The severity of these Angle Crashes, however, decreased more noticeably. In the before period, Angle Crashes resulted in two A injuries, one B injury, and two C injury crashes. In the after period, Angle Crashes accounted for one B injury crash.

There were eleven Left-Turn, Same Roadway Crashes in the after period at the Treatment Location (an increase of 266.7 percent from the before period). Eight of these crashes occurred when a southbound vehicle on SR 1300-Kildaire Farm Road attempted to turn left onto eastbound Lochmere Drive. A Protected-Permitted Signal may alleviate this Left, Same Roadway Crash problem.

Please see the attached Treatment Site Photos. Photos are provided for each leg of the intersection. In addition, a photo of landscaping that is causing potential site distance problems on the east leg of

the Treatment Intersection is enclosed. Vehicles turning right on red from this approach of Lochmere Drive have difficulty because the shrubbery is blocking their view of northbound traffic.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 39.6 percent decrease to a 68.2 percent increase in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection is a 42.9 percent increase in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

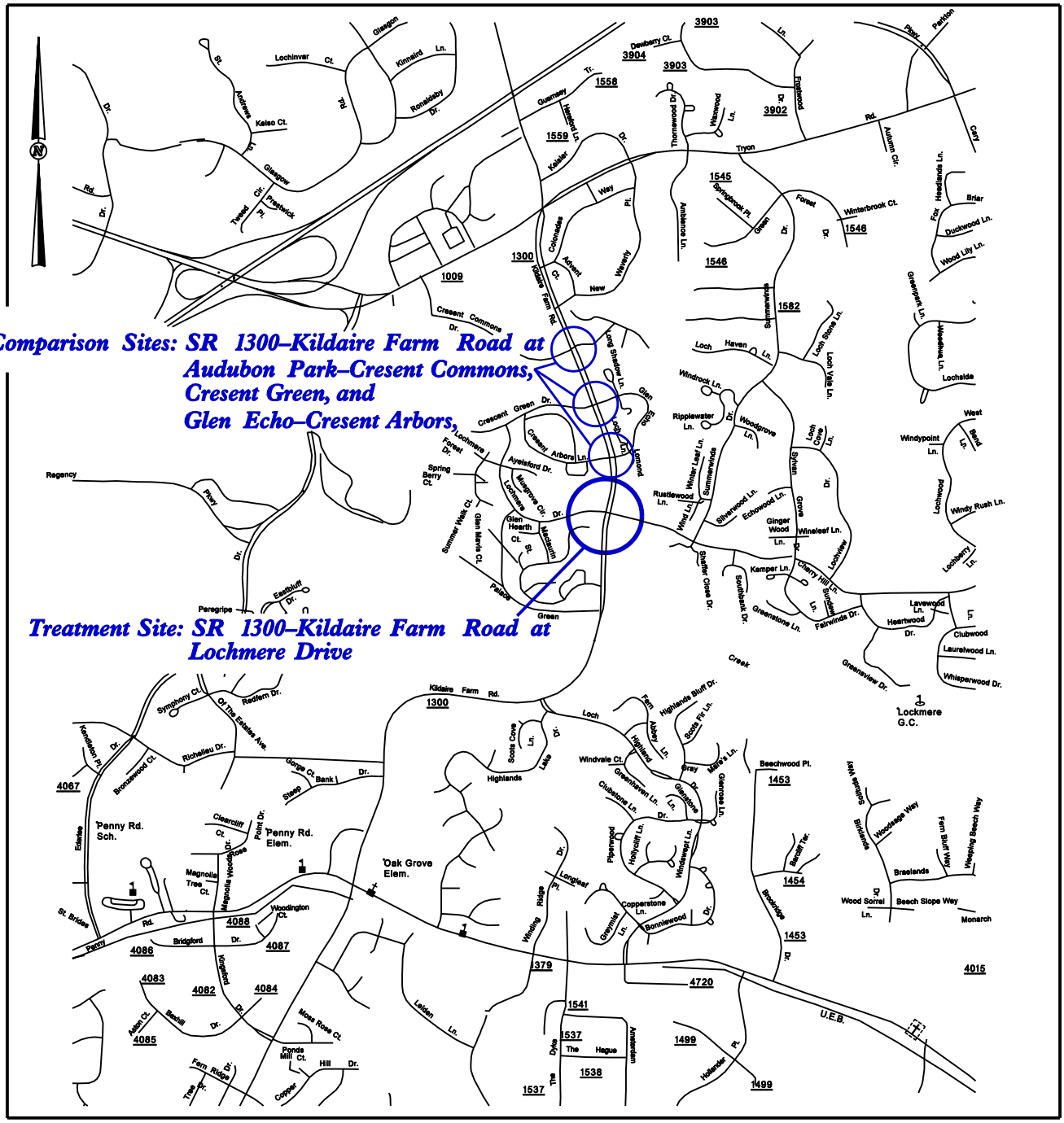
**Table 1. Treatment Intersection Overall Crash Summary and Crash Type Summary**

| OVERALL CRASH SUMMARY | Before Period | After Period | Percent Change |
|---|---|---|---|
| Total Crashes | 22 | 37 | 68.2 |
| Fatal Crashes | 0 | 0 | n/a |
| Non-Fatal Injury Crashes | 12 | 12 | 0.0 |
| Total Injury Crashes | 12 | 12 | 0.0 |
| PDO Crashes | 10 | 25 | 150.0 |
| Night Crashes | 6 | 6 | 0.0 |
| Wet Crashes | 5 | 4 | -20.0 |
| | | | |
| Total Crash Rate | 58.24 | 76.92 | 32.1 |
| Fatal Crash Rate | 0 | 0 | n/a |
| Non Fatal Crash Rate | 31.7 | 24.95 | -21.3 |
| Night Crash Rate | 15.88 | 12.47 | -21.5 |
| Wet Crash Rate | 13.24 | 8.32 | -37.2 |
| | | | |
| Annual ADT | 15700 | 20000 | 27.4 |
| Total Vehicle Exposure | 37.77 | 48.1 | 27.3 |
| Severity Index | 11.25 | 3.4 | -69.8 |

| CRASH TYPE SUMMARY | Before Period | After Period | Percent Change |
|---|---|---|---|
| Angle | 6 | 5 | -16.7 |
| Backing Up | 0 | 1 | n/a |
| Fixed Object | 1 | 0 | -100.0 |
| Left Turn, Different Roadways | 2 | 2 | 0.0 |
| Left Turn, Same Roadways | 3 | 11 | 266.7 |
| Other Non-Collision | 0 | 1 | n/a |
| Overturn/Rollover | 1 | 0 | -100.0 |
| Pedalcyclist | 1 | 0 | -100.0 |
| Ran Off Road - Left | 0 | 2 | n/a |
| Ran Off Road - Right | 2 | 1 | -50.0 |
| Rear End, Slow or Stop | 1 | 8 | 700.0 |
| Rear End, Turn | 0 | 1 | n/a |
| Right Turn, Different Roadways | 2 | 0 | -100.0 |
| Right Turn, Same Roadway | 1 | 2 | 100.0 |
| Sideswipe, Same Direction | 2 | 3 | 50.0 |

# *Location Map, in Cary, Wake County*

## *Evaluation of Spot Safety Project Number 05–94–037*

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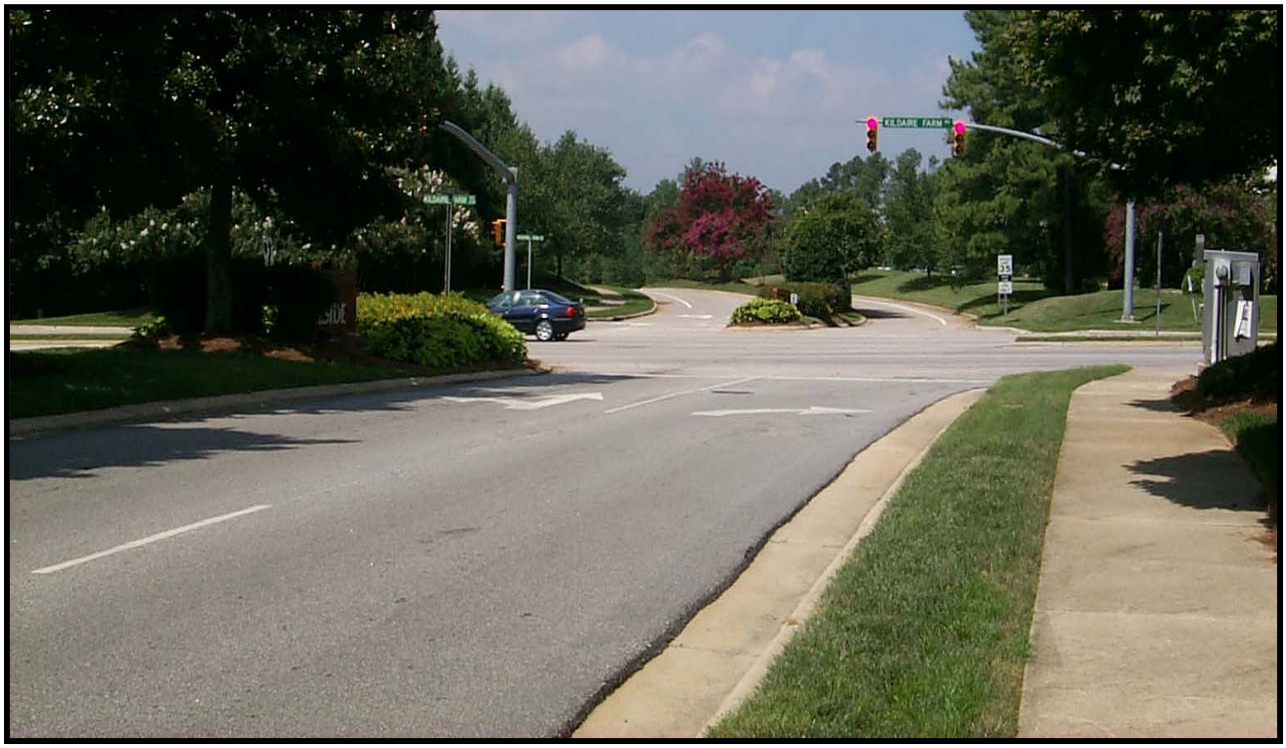
# *Treatment Site Location Photos (Taken on August 25, 2004)*

**Looking East on Lochmere Drive**




**Looking West on Lochmere Drive**

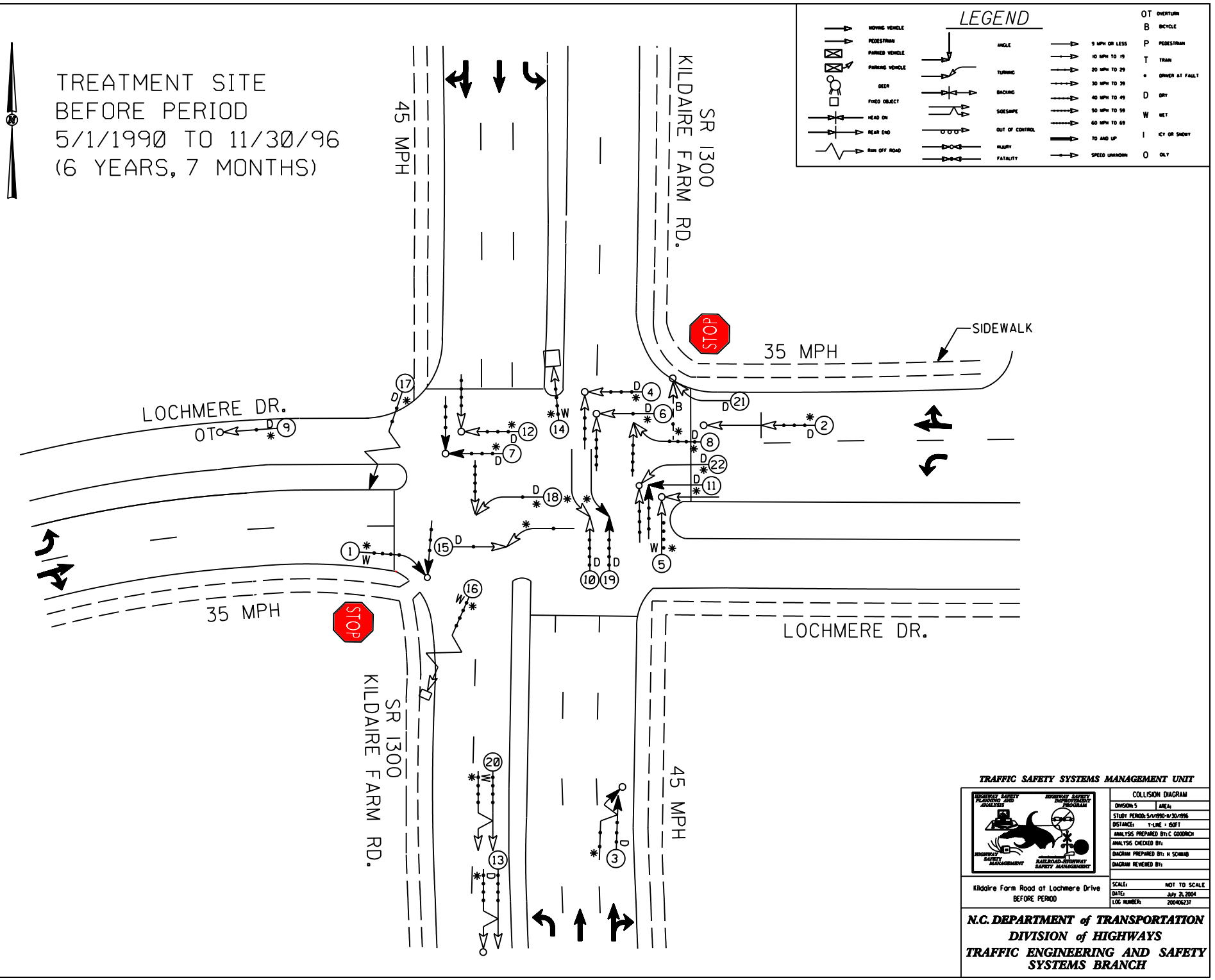
# *Treatment Site Location Photos (Taken on August 25, 2004)*


**Landscaping on Lochmere creates a sight distance problem for westbound vehicles turning right onto Kildaire Farm Road.**

# *Treatment Site Location Photos (Taken on August 25, 2004)*

**Looking North on SR 1300-Kildaire Farm Road**

**Looking South on SR 1300-Kildaire Farm Road**

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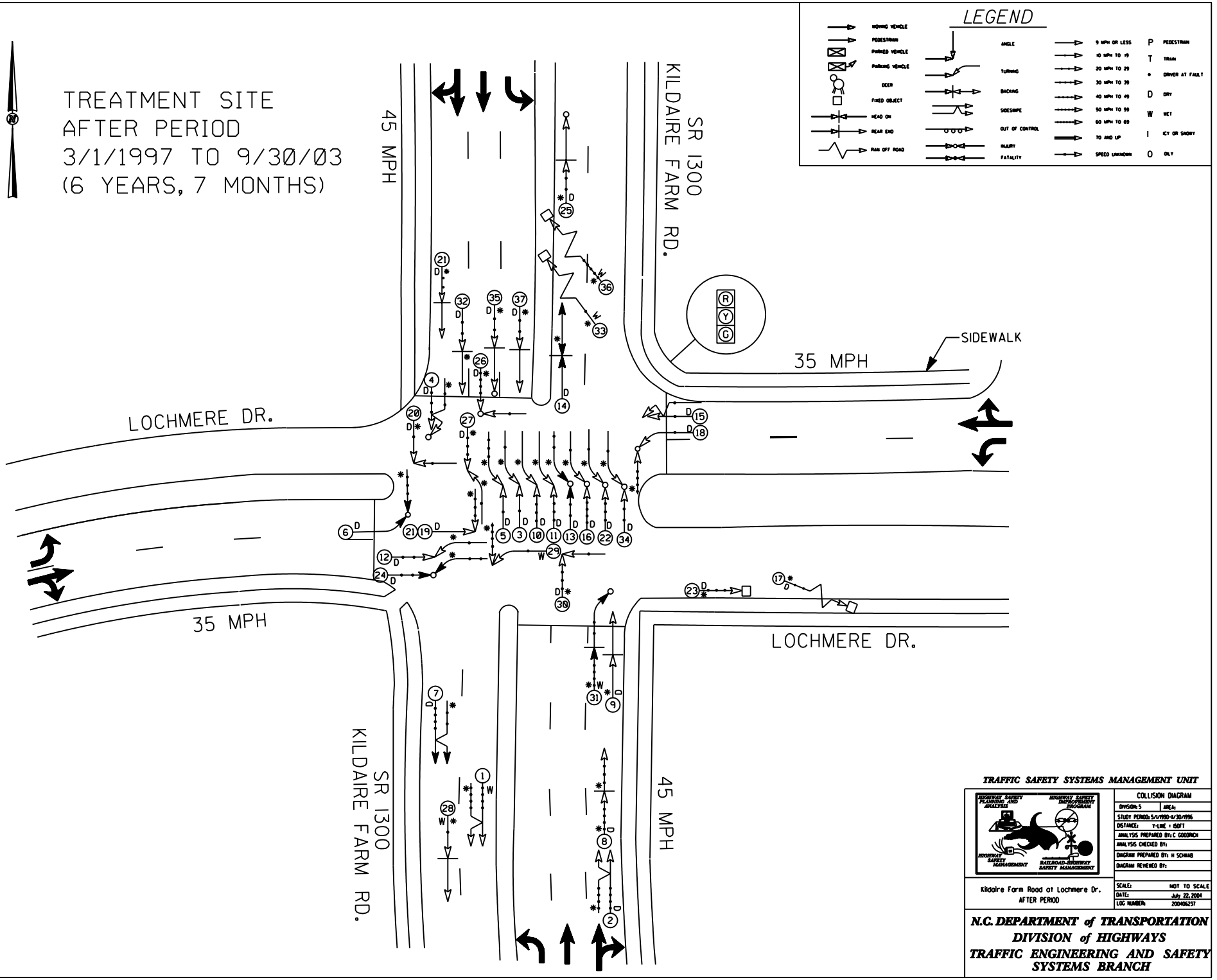


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